@ 004

7

FTP TESTS (CONT.)

<u>Date</u>	Odometer	Lab	Fuel	THC GPM	CO QPM	NOx <u>GPM</u>	F.E. MPG	Part. <u>GPM</u>	Freon <u>Conc</u>
7/24/91	10402	EPA2	MMT	0.321	2.386	0.522	22.4	0.008	None
7/25/91	10483	EPA2	MMT	0.335	2.526	0.532	22.5	0.007	None
7/26/91	10565	EPA2	MMT/FREON	0.368	2.472	0.578	22.5	0,012	30 ppm
7/27/91	10646	EPA2	MMT/FREON	0.397	2.806	0.610	22.5	0.040	250 ppm
7/28/91	10728	EPA2	MMT	0.334	2.513	0.559	22.3	0.008	None
7/29/91	10809	EPA2	MMT	0.337	3.292	0.559	22.2	0.006	None
EPA	2	Mean		0.332	26/3	702546E	22/3/2	310.006-21	
MMT	Stand	lard Dev	iation	0.007	0.413	0.018	0.1	0.001	
EPA	# #	Mean		0.383	2.635.2	0.594	2226	0.028	
MMT/FREON	Stand	ard Dev	iation	0.021	0.236	0.023	0.0	0.020	
7.04.04	40000	CDAO	<u> </u>	5.246	2 000	0.400	20.4	0.005	Ness
7/31/91	10935	EPA2	Clear	0.346	3.000	0.499	22.4	0.005	None
8/1/91	11015	EPA2	Clear	0:347	3.220	0.551	22.3	D.004	None
EPA	137 158 158 158	Mean		0;947	3 3 30 3	0.525	22.4	S.JC4	
Clear	Stand	ard Dev	iation	0.001	0.155	0.037	0.1	0.001	

NOTES:

FTP TESTS DATED 7/1 AND 7/2/91 WERE CONDUCTED WITH THE FUEL CONTAINED IN THE VEHICLE TANK AS SHIPPED FROM MVEL.

TESTS DATED 7/8, 7/9 AND 7/10/91 WERE CONDUCTED WITH EPA CERTIFICATION FUEL WITH MMT ADDED BY ETHYL.

ALL TESTS LISTED IN RUN ORDER

EPA2 IS THE SECOND SET OF TESTS AT EPA RUN FOR THIS PROGRAM

EPA ANN ARBOR --- ETHYL STL G.O.

Ø 005

HIGHWAY TESTS

Date Odometer Leb Fuel GPM GPM GPM MPG GPM Cong	_								_	_
STATE STAT	Date	Odometer	<u>Lab</u>	<u>Fual</u>	THC GPM	CO <u>GPM</u>	NOx GPM	F.E MPG	Part. <u>GPM</u>	Freen <u>Conc</u>
6/18/91 9285 EPA MMT/FREON 0.036 0.472 0.097 35.3 0.065 Unknown 6/19/91	6/13/91	8649	EPA	MMT/FREON	0.049	0.858	0.144	33.9	0.041	Unknown
EPA MMTFREON 0.040 0.693 0.126 34.5 0.089 Unknown EPA MMTFREON Standard Deviation 0.095 0.165 0.057 0.7 0.028 7/3/91 SwRI MMT 0.05 0.80 0.12 33.8 0.016 None 7/8/91 SwRI MMT 0.04 0.78 0.13 33.8 0.006 None 7/9/91 SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI MMT 0.05 0.80 0.12 33.8 0.006 None 7/9/91 SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRI Clear 0.04 0.64 0.15 34.2 0.002 None SwRI Meet Down 0.04 0.69 0.12 35.7 0.001 None SwRI Meet Down 0.00 0.04 0.69 0.12 35.7 0.001 None SwRI Meet Down 0.00 0.04 0.09 0.12 35.7 0.001 None 7/24/91 10413 EPA2 MMT 0.026 0.326 0.130 35.3 0.017 None 7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMTFREON 0.034 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMTFREON 0.034 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMTFREON 0.033 0.483 0.129 34.8 0.001 7/29/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None FPA Meet Deviation 0.003 0.089 0.025 0.6 0.000 None EPA Meet Down 100 0.001 0.012 0.008 0.2 0.001 7/31/91 10946 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA Meet Deviation 0.001 0.012 0.008 0.2 0.003 None EPA Meet Deviation 0.001 0.012 0.008 0.2 0.001	6/14/91	8732	EPA	MMT/FREON	0.043	0.582	0.015	33.9	0.026	Unknown
EPA MMT/FREON Standard Deviation 0.005 0.165 0.057 0.7 0.028 7/3/91 SwRi MMT 0.05 0.80 0.12 33.8 0.016 None 7/8/91 SwRi MMT 0.04 0.78 0.13 33.8 0.006 None 7/9/91 SwRi MMT 0.04 0.78 0.13 33.8 0.006 None 7/9/91 SwRi MMT 0.04 0.71 0.13 34.1 0.003 None SwRi MMT Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRi Clear 0.04 0.64 0.15 34.2 0.002 None 7/11/91 SwRi Clear 0.04 0.69 0.12 35.7 0.001 None SwRi Clear 0.04 0.05 0.01 0.02 0.01 0.001 None SwRi Clear 0.04 0.05 0.05 0.01 0.001 None SwRi Clear 0.004 0.00 0.04 0.02 0.11 0.001 None SwRi Clear 0.004 0.00 0.01 0.001 0.	6/18/91	9285	EPA	MMT/FREON	0.036	0.472	0.097	35.3	0.065	Unknown
MMT/FREON Standard Deviation 0.005 0.185 0.057 0.7 0.028	6/19/91		EPA	MMT/FREON	0.040	0.693	0.126	34.5	0.089	Unknown
7/3/91	EPA	3	Mean		60 042 c	0.851	7.000		0,056	
7/8/91 SwRI MMT 0.04 0.78 0.13 33.8 0.006 None SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI MMT Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRI Clear 0.04 0.64 0.15 34.2 0.002 None 7/10/91 SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI Meet 0.04 0.69 0.12 35.7 0.001 None SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI Clear 0.04 0.69 0.12 35.7 0.001 None T/26/91 10413 EPA2 MMT 0.000 0.04 0.02 1.1 0.001 7/26/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.060 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None T/29/91 10820 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None EPA MMEET 0.034 0.008 0.2 0.021 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.009 None EPA MMT/FREON 0.003 0.009 0.025 0.6 0.004 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.004 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.002 None EPA MMT/FREON 0.003 0.009 0.008 0.2 0.002 None	MMT/FREON	Stan	idard De	viation	0.005	0.165	0.057	0,7	0.028	
7/8/91 SwRI MMT 0.04 0.78 0.13 33.8 0.006 None SwRI MMT 0.04 0.71 0.13 34.1 0.003 None SwRI MMT Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRI Clear 0.04 0.64 0.15 34.2 0.002 None 7/10/91 SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI Meet 0.04 0.69 0.12 35.7 0.001 None SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI Clear 0.04 0.69 0.12 35.7 0.001 None T/26/91 10413 EPA2 MMT 0.000 0.04 0.02 1.1 0.001 7/26/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.060 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None T/29/91 10820 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None EPA MMEET 0.034 0.008 0.2 0.021 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.009 None EPA MMT/FREON 0.003 0.009 0.025 0.6 0.004 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.004 EPA MMT/FREON 0.003 0.009 0.025 0.6 0.002 None EPA MMT/FREON 0.003 0.009 0.008 0.2 0.002 None	7/3/91		SwBI	MMT	0.05	0.80	0.12	33.8	0.016	None
SwRI MMT Signature SwRI MMT Signature SwRI Signature SwRI Signature SwRI Signature SwRI Signature SwRI Signature SwRI SwRI Clear O.04 O.64 O.15 34.2 O.002 None O.01 O.05 O.01 O.02 O.007										
MMT Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRI Clear 0.04 0.64 0.15 34.2 0.002 None 7/11/91 SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI West 0.02 0.02 0.03 0.00 0.04 0.02 1.1 0.001 7/24/91 10413 EPA2 MMT 0.026 0.326 0.130 35.3 0.017 None 7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/28/91 10575 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.032 0.527 0.126										
MMT Standard Deviation 0.01 0.05 0.01 0.2 0.007 7/10/91 SwRI Clear 0.04 0.64 0.15 34.2 0.002 None 7/11/91 SwRI Clear 0.04 0.69 0.12 35.7 0.001 None SwRI West 0.02 0.02 0.03 0.00 0.04 0.02 1.1 0.001 7/24/91 10413 EPA2 MMT 0.026 0.326 0.130 35.3 0.017 None 7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/28/91 10575 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.032 0.527 0.126	SwRI	3	Meer		10.04	076	0.00	// S2 B=		
7/11/91 SwRI Clear 0.04 0.89 0.12 35.7 0.001 None SwRI		•	(-C. C. Complete Compl	mercustrates and a	Charles to the second of the Contract	Committee of the Control of the Control	CONTRACTOR OF THE PARTY.	A britanian and color britanian and an article by	
SwRI Clear New Standard Deviation 0.05 0367 (0.02) 0.14 (0.02) 0.099 (0.04) 7/24/91 10413 EPA2 MMT (0.026) 0.326 (0.130) 35.3 (0.017) None (0.027) 7/25/91 10491 EPA2 MMT (0.033) 0.500 (0.112) 34.0 (0.015) None (0.015) 7/26/91 10576 EPA2 MMT/FRECN (0.034) 0.500 (0.138) 35.1 (0.031) 30 ppm (0.027) 7/27/91 10657 EPA2 MMT/FRECN (0.033) 0.483 (0.129) 34.8 (0.080) 250 ppm (0.028) 7/28/91 10739 EPA2 MMT (0.029) 0.467 (0.075) 35.1 (0.018) None (0.018) 7/29/91 10820 EPA2 MMT (0.032) 0.527 (0.126) 34.9 (0.009) None (0.009) EPA Meen (0.001) 0.003 0.089 (0.025) 0.6 (0.004) 0.004 EPA Meen (0.001) 0.003 0.089 (0.025) 0.6 (0.004) 0.004 EPA Meen (0.001) 0.003 (0.002) 0.003 (0.003) 0.003 (0.003) 0.003 (0.003) 0.003 (0.003) 8/1/91 10946 (0.003) EPA2 (0.003)	7/10/91		SWRI	Clear	0.04	0,64	0.15	34.2	0.002	None
Clear Standard Deviation D.00 D.04 D.02 D.11 D.001	7/11/91		SwRI	Clear	0.04	0.69	0.12	35.7	0.001	None
7/24/91 10413 EPA2 MMT 0.026 0.326 0.130 35.3 0.017 None 7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10820 EPA2 MMT 0.032 0.527 0.126 34.9 0.009 None EPA Meen 0.090 0.025 0.12 34.9 0.009 None EPA Meen 0.090 0.025 0.6 0.004 EPA Meen 0.093 0.089 0.025 0.6 0.004 T/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None EPA Meen 0.001 0.012 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None EPA Meen 0.002 0.398 0.101 35.2 0.003 None EPA Meen 0.002 0.002 0.417 0.123 35.3 0.002 None	SwRI	;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	Mean		0.0	E 5 (57)	0.14	95 0	0.005	
7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10820 EPA2 MMT 0.032 0.527 0.126 34.9 0.009 None EPA Mean 0/090 0.467 0.075 35.1 0.018 None EPA Mean 0/090 0.467 0.075 35.1 0.018 None EPA Mean 0/090 0.527 0.126 34.9 0.009 None EPA Mean 0/090 0.089 0.025 0.6 0.004 EPA None 0.003 0.089 0.025 0.6 0.004 EPA None 0.003 0.089 0.025 0.6 0.004 EPA None 0.003 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None	Clear	Stand	dard Dev	iation	.0.00	0.04	0-02	1.1	0.001	
7/25/91 10491 EPA2 MMT 0.033 0.500 0.112 34.0 0.015 None 7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10820 EPA2 MMT 0.032 0.527 0.126 34.9 0.009 None EPA Mean 0/090 0.467 0.075 35.1 0.018 None EPA Mean 0/090 0.467 0.075 35.1 0.018 None EPA Mean 0/090 0.527 0.126 34.9 0.009 None EPA Mean 0/090 0.089 0.025 0.6 0.004 EPA None 0.003 0.089 0.025 0.6 0.004 EPA None 0.003 0.089 0.025 0.6 0.004 EPA None 0.003 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None	7/24/91	10413	EDA2	MMT	0.026	0 326	n 130	25.3	0.017	None
7/26/91 10576 EPA2 MMT/FREON 0.034 0.500 0.138 35.1 0.031 30 ppm 7/27/91 10657 EPA2 MMT/FREON 0.033 0.483 0.129 34.8 0.080 250 ppm 7/28/91 10739 EPA2 MMT 0.029 0.467 0.075 35.1 0.018 None 7/29/91 10820 EPA2 MMT 0.032 0.527 0.126 34.9 0.009 None EPA										
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7/29/91 10820 EPA2 MMT 0.032 0.527 0.126 34.9 0.009 None EPA										• •
MMT Standard Deviation 0.003 0.089 0.025 0.6 0.004 EPA Meen 0.034 0.492 0.134 95.6 0.046 MMT/FREON Standard Deviation 0.001 0.012 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA Mean 0.026 -0.08 0.12 95.9 0.002										
MMT Standard Deviation 0.003 0.089 0.025 0.6 0.004 EPA Mean 0.034 0.492 0.138 95.0 0.046 MMT/FREON Standard Deviation 0.001 0.012 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA Mean -0.026 -0.08 0.12 95.9 0.002	EPA	EMparte San						34.8	0.015	
MMT/FREON Standard Deviation 0.001 0.012 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA	MMT	1-			0.003	CONTRACTOR SANDERS COMME	motoring contract of every suit	white an arrange of the Policy of	كالتاكيان الدما عنظ فلنطب بمناجلة	
MMT/FREON Standard Deviation 0.001 0.012 0.008 0.2 0.021 7/31/91 10946 EPA2 Clear 0.025 0.398 0.101 35.2 0.003 None 8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA	EPA	50 00 24 70	-Mezn		0.534	-0:492=	0-1847	35.0	0.046	
8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA	MMT/FREON	Standard Deviation					Management of the State of the State of	and market by the party of the party of	0.021	
8/1/91 11027 EPA2 Clear 0.027 0.417 0.123 35.3 0.002 None EPA	7/31/91	10945	EPA2	Clear	0.025	0.398	0 101	35.2	0.003	None
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。	EPA	1-0	Mach		0.026	8020	0.112	- 25.9	5.002	
	Clear	The state of the s						CONTRACTOR SECURITION OF THE PROPERTY OF THE P	Q.001	

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NYCC TESTS

Date	Odometer	Lab	<u>Fuel</u>	THC GPM	CO GPM	NOx GPM	F.E.	Part.	Freon Cone
6/13/91	8710	EPA	MINIT/FREON	0.524	2.857	1.164	11.1	0.028	Unknown
6/14/91	8792	EPA	MMT/FREON	0.371	1.999	1.362	12.5	0.009	Unknown
6/18/91	9348	EPA	MMT/FREON	0.530	2.287	1.302	12.7	0.038	Unknown
5/19/91	9419	EPA	MMT/FREON	0.941	3.214	1.641	11.4	0.049	Unknown
EPA	ž Š	Mean		. C 192	2:5892	= 6387	e aca		
MMT/FREON	Stan	dard De	viation	0.244	0.548	0.200	8.0	0.017	
7/3/91		SwRI	MMT	0.37	3,84	1.45	11.1	0.012	None
7/8/91		SwRI	MMT	0.39	5.10	1.24	11.3	0.011	None
7/9/91		SwRI	MMT	0.44	4.85	1,48	11.0	0.004	None
SWRI		Mean		To.40	- 4.60			20009	
MMT	Stand	lard De	viation.	0.04	0.67	0.12	0,2	0.004	
7/10/91		SwRI	Clear	0.40	4.68	1.32	11.3	0.004	None
7/11/91		SwRI	Clear	0.36	4.24	1.31	11.7	0.003	None
SWRI	# **	Mean		3038/		1/32		0.004	
Clear	•	lard Dev		0.03	0.31	0.01	0.3	0.001	
7/24/91	10473	EPA2	MMT	0.29	2.59	1,04	11.5	0.014	None
7/25/91	10555	EPAZ	MAT	0.30	2.62	0.98	11.5	0.014	None
7/26/91	10636	EPA2	MMT/FREON	0.44	2.87	1.77	11.5	0.017	30 ppm
7/27/91	10718	EPA2	MMT/FREON	0.63	2.81	1.33	11.6	0.032	250 ppm
7/28/91	10799	EPA2	MMT	0.29	2.13	0.84	11.4	0.010	None
7/29/91	10881	EPA2	MVT	0.29	3.48	1.55	11,5	0.016	None
EPA	\	Mean		0.291	2705	-1 103	61.5	0.014	
MMT		ard Dev	iation	D.004	0.586	0.310	0.1	0.003	
EPA		alde an		/0.5c/		2.550		0.028	
MMT/FREON	Stand		0.137	0.042	0.306	0.1	0.011		
7/31/91	11007	EDAS	Clear	0.276	2.157	1 617	11.6	0.012	Noce
8/1/91		EPA2		0.528			11.6 11.9	0.016 0.014	None None
	225	Marian Modernia de Caracterio					· 'el-wermanist de 'mana na zeresel		
EPA	-	Meen		Contraction Transmission	- 4.858	THE PERSON NAMED OF STREET		0.015	
Clear	Stand:	ard Dev	anon	0.178	3.536	0.334	0.2	0.001	

Reply to M. Davis Comment Regarding Uncertainty Factor of 3 for Increased Exposure Public Hearing Transcript, p. 86 AND 87

The Roels et al.¹ paper cited by EPA as the basis for determining the R_fC for manganese states that production has increased over the years and suggests that exposures may have increased.

"No monitoring data were available to characterize the past pollution of the work environment by manganese. It should however be pointed out that the Mn plant started production in 1964 and that the production processes and the different halls have not subsequently undergone environmentally significant changes." (Reference 1, p. 309.)

This statement suggests that the production increase was accomplished without changes in the production areas. This leads to the conclusion that:

"The current average exposure of 1 mg Mn/m³ is most likely an overestimation for the exposure intensity in the past, since the production capacity gradually increased over the last 15 years." (Reference 1, p. 324.)

In addition, the authors state:

"However, in view of the increased manganese production over the last 15 years, it is possible that the average level of exposure to Mn dust was less than 1 Mg/m³ in the past." (Reference 1, p. 322.)

It should be noted, moreover, that a comparison paper² states that significant changes occurred in production areas such that increased production would not lead to increased exposure.

"It should be pointed out that this plant started production in 1964 and that the initial production process and the various buildings are still in use, although significant additions have been made to them." (Reference 2, p. 299.)

This statement implies that production was increased by increasing production areas, not pushing higher production through the same facilities. In fact, this is the way production was increased at the plant in question. Both the professor in whose laboratory the researchers worked, Dr. Lauwerys, and the plant management, have indicated that exposures have not increased as production increased because of these additional production areas.³

It is a generally accepted tenant in industrial hygiene practice that a production increase does not necessarily mean increases in exposures to chemicals. For instance, increasing production by adding additional shifts may actually result in lowered exposures because continually operating processes tend to have lower emissions than intermittent processes.⁴

The EPA's decision to include an uncertainty factor of three in derivation of the R_fC for manganese to account for potentially higher manganese exposures at the plant in the past was in appropriate. Without this uncertainty factor, the R_fC for manganese would be 1.2 ug/m³, not 0.4 ug/m³.

References:

- 1. Roels, H. et al., Epidemiological Survey Among Workers Exposed to Manganese, Effects on Lung, Central Nervous System, and Some Biological Indices, Am. J. Ind. Hlth., 11:307-327 (1987).
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